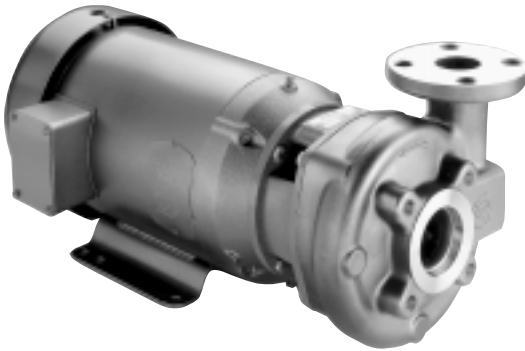


# Installation, Operation and Maintenance Instructions

# Model 3657/3757



**3657**



**3757**

### Owner's Information

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Dealer: \_\_\_\_\_

Date of Purchase: \_\_\_\_\_ Date of Delivery: \_\_\_\_\_

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## SAFETY INSTRUCTIONS

**TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN THE MANUAL AND ON THE PUMP.**



This is a **SAFETY ALERT SYMBOL**. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.



**DANGER** Warns of hazards that **WILL** cause serious personal injury, death or major property damage.



**WARNING** Warns of hazards that **CAN** cause serious personal injury, death or major property damage.







**CAUTION** Warns of hazards that **CAN** cause personal injury or property damage.


**NOTICE: INDICATES SPECIAL INSTRUCTIONS WHICH ARE VERY IMPORTANT AND MUST BE FOLLOWED.**

**THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT. THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.**

**MAINTAIN ALL SAFETY DECALS.**



-  Install, ground and wire according to local and National Electrical Code Requirements.
-  Install an all leg disconnect switch near the pump.
-  Disconnect and lockout electrical power before installing or servicing the pump.
-  Electrical supply must match motor's nameplate specifications. Incorrect voltage can cause fire, damage motor and void the warranty.

-  Single phase pump motors are equipped with an automatic thermal protector, which opens the motor's electrical circuit when an overload condition exists. This can cause the pump to start unexpectedly.

## DESCRIPTION and SPECIFICATIONS

The Models 3657 (close-coupled) and 3757 (frame-mounted) are single-stage end-suction pumps designed for ultra-pure water systems, O.E.M. applications, food and beverage processing and chemical services not demanding ANSI standard equipment.

The pumps have fully enclosed, investment cast, AISI TYPE 316 stainless steel impellers, key driven and held in position by an o-ring sealed locknut. The full volute casings are also investment castings of AISI TYPE 316 stainless steel, back pull-out configuration, with connections for mating with standard 150 lb. ANSI flanges. Shafts are protected with o-ring sealed stainless steel sleeves. Shaft sealing is with mechanical seal.

Close-coupled units have NEMA frame motors, C-face mounting, JM shaft extension. Frame mounted units can be coupled to motors through a spacer coupling, or belt driven.

### 1. Important:

- 1.1. Inspect unit for damage. Report any damage to carrier/dealer immediately.
- 1.2. Electrical supply must be a separate branch circuit with fuses or circuit breakers, wire sizes, etc. per National and Local electrical codes. Install an all-leg disconnect switch near pump,



**WARNING**  
Hazardous  
voltage

**ALWAYS DISCONNECT ELECTRICAL POWER WHEN HANDLING PUMP OR CONTROLS.**

- 1.3. Motors must be wired for proper voltage. Motor wiring diagram is on motor nameplate. Wire size must limit maximum voltage drop to 10% of nameplate voltage at motor terminals, or motor life and pump performance will be lowered.
- 1.4. Always use horsepower-rated switches, contactors and starters.
- 1.5. Motor Protection:
  - 1.5.1. Single-phase: Thermal protection for single-phase units is sometimes built in (check nameplate). If no built-in protection is provided, use a contactor with a proper overload. Fusing is permissible.
  - 1.5.2. Three-phase: Provide three-leg protection with properly sized magnetic starter and thermal overloads.
- 1.6. Maximum Operating Limit(s):
  - Liquid Temperature: 212°F (100°C) with standard seal.  
250°F (120°C) with optional high temp. seal.
  - Pressure: 175 PSI.
  - Starts per Hour: 20, evenly distributed.
- 1.7. Regular inspection and maintenance will increase service life. Base schedule on operating time. Refer to Section 8.

### 2. Installation:

- 2.1. General
    - 2.1.1. Locate pump as near liquid source as possible (below level of liquid for automatic operation).
    - 2.1.2. Protect from freezing or flooding.
    - 2.1.3. Allow adequate space for servicing and ventilation.
    - 2.1.4. All piping must be supported independently of the pump, and must "line-up" naturally.
- CAUTION: NEVER DRAW PIPING INTO PLACE BY FORCING THE PUMP SUCTION AND DISCHARGE CONNECTIONS.**
- 2.1.5. Avoid unnecessary fittings. Select sizes to keep friction losses to a minimum.
  - 2.1.6. After the piping is complete, rotate the unit by hand to check for any binding.
- 2.2. Close-Coupled Units:
    - 2.2.1. Units may be installed horizontally, inclined or vertically.

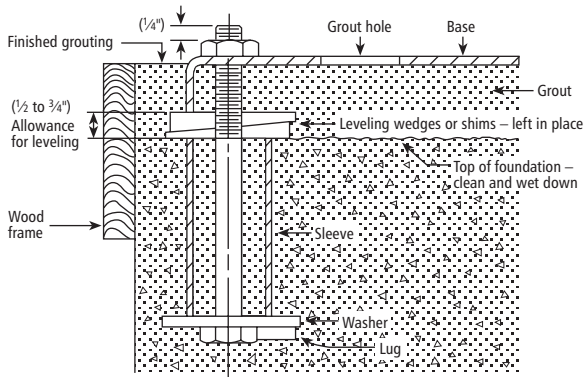
**CAUTION: DO NOT INSTALL WITH MOTOR BELOW PUMP. ANY LEAKAGE OR CONDENSATION WILL AFFECT THE MOTOR.**

2.2.2. Foundation must be flat and substantial to eliminate strain when tightening bolts. Use rubber mounts to minimize noise and vibration.

2.2.3. Tighten motor hold-down bolts before connecting piping to pump.

**2.3. Frame-Mounted Units:**

2.3.1. Bedplate must be grouted to a foundation with solid footing. Refer to Fig. 1.



**Figure 1**

2.3.2. Place unit in position on wedges located at four points (two below approximate center of driver and two below approximate center of pump). Adjust wedges to level unit. Level or plumb suction and discharge flanges.

2.3.3. Make sure bedplate is not distorted and final coupling alignment can be made within the limits of movement of motor and by shimming, if necessary.

2.3.4. Tighten foundation bolts finger tight and build dam around foundation. Pour grout under bedplate making sure the areas under pump and motor feet are filled solid. Allow grout to harden 48 hours before fully tightening foundation bolts.

2.3.5. Tighten pump and motor hold-down bolts before connecting the piping to pump.

**3. Suction Piping:**

3.1. Low static suction lift and short, direct, suction piping is desired. For suction lift over 10 feet and liquid temperatures over 120°F, consult pump performance curve for Net Positive Suction Head Required.

3.2. Suction pipe must be at least as large as the suction connection of the pump. Smaller size will degrade performance.

3.3. If larger pipe is required, an eccentric pipe reducer (with straight side up) must be installed at the pump.

3.4. Installation with pump below source of supply:

3.4.1. Install full flow isolation valve in piping for inspection and maintenance.

**CAUTION: DO NOT USE SUCTION ISOLATION VALVE TO THROTTLE PUMP.**

3.5. Installation with pump above source of supply:

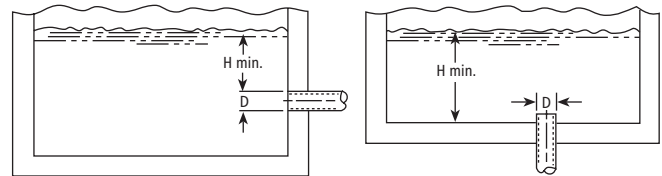
3.5.1. Avoid air pockets. No part of piping should be higher than pump suction connection. Slope piping upward from liquid source.

3.5.2. All joints must be airtight.

3.5.3. Foot valve to be used only if necessary for priming, or to hold prime on intermittent service.

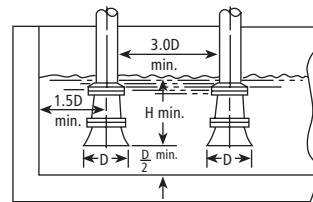
3.5.4. Suction strainer open area must be at least triple the pipe area.

3.6. Size of inlet from liquid source, and minimum submergence over inlet, must be sufficient to prevent air entering pump through vortexing. See Figs. 2-5.

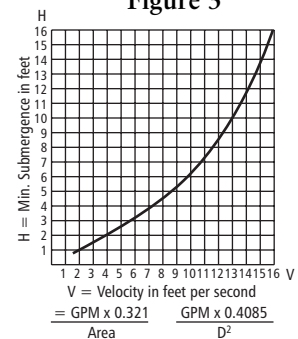


**Figure 2**

**Figure 3**



**Figure 4**



**Figure 5**

**4. Discharge Piping:**

4.1. Arrangement must include a check valve located between a gate valve and the pump. The gate valve is for regulation of capacity, or for inspection of the pump or check valve.

4.2. If an increaser is required, place between check valve and pump.

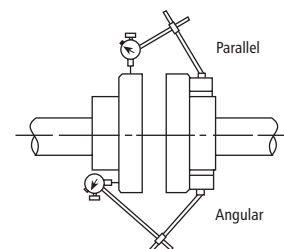
**5. Motor-to-Pump Shaft Alignment:**

5.1. Close-Coupled Units:

5.1.1. No field alignment necessary.

5.2. Frame-Mounted Units:

5.2.1. Even though the pump-motor unit may have a factory alignment, this could be disturbed in transit and must be checked prior to running. See Fig. 6.



**Figure 6**

5.2.2. Tighten all hold-down bolts before checking the alignment.

5.2.3. If re-alignment is necessary, always move the motor. Shim as required.

5.2.4. Parallel misalignment - shafts with axis parallel but not concentric. Place dial indicator on one hub and rotate this hub 360° while taking readings on the outside diameter of the other hub. Parallel alignment occurs when Total Indicator Reading is .005", or less.

5.2.5. Angular misalignment – shafts with axis concentric but not parallel. Place dial indicator on one hub and rotate this hub 360° while taking readings on the face of the other hub. Angular alignment is achieved when Total Indicator Reading is .005", or less.

5.2.6. Final alignment is achieved when parallel and angular requirements are satisfied with motor hold-down bolts tight.

**CAUTION: ALWAYS RECHECK BOTH ALIGNMENTS AFTER MAKING ANY ADJUSTMENT.**

## 6. Rotation:

6.1. Correct rotation is right-hand (clockwise when viewed from the motor end). Switch power on and off quickly. Observe shaft rotation. To change rotation:

6.1.1. Single-phase: Refer to wiring diagram on motor.

6.1.2. Three-phase: Interchange any two power supply leads.

## 7. Operation:

7.1. Before starting, pump must be primed (free of air and suction pipe full of liquid) and discharge valve partially open.

**CAUTION: PUMPED LIQUID PROVIDES LUBRICATION. IF PUMP IS RUN DRY, ROTATING PARTS WILL SEIZE AND MECHANICAL SEAL WILL BE DAMAGED. DO NOT OPERATE AT OR NEAR ZERO FLOW. ENERGY IMPARTED TO THE LIQUID IS CONVERTED INTO HEAT. LIQUID MAY FLASH TO VAPOR. ROTATING PARTS REQUIRE LIQUID TO PREVENT SCORING OR SEIZING.**

7.2. Make complete check after unit is run under operating conditions and temperatures has stabilized. Check for expansion of piping. On frame-mounted units coupling alignment may have changed due to the temperature differential between pump and motor. Recheck alignment.

## 8. Maintenance:

8.1. Close-Coupled Units: Bearings are located in and are part of the motor. For lubrication procedure, refer to motor manufacturer's instructions.

8.2. Frame-Mounted Units:

8.2.1. Bearing frame should be regreased every 2,000 hours or 3 month interval, whichever occurs first. Use a #2 sodium or lithium based grease. Fill until grease comes out of relief fittings, or lip seals, then wipe off excess.

8.2.2. Follow motor and coupling manufacturer's lubrication instructions.

8.2.3. Alignment must be rechecked after any maintenance work involving any disturbance of the unit.

## 9. Disassembly:

Complete disassembly of the unit will be described. Proceed only as far as required to perform the maintenance work needed.

9.1. Turn off power.

9.2. Drain system. Flush if necessary.

9.3. Close-Coupled Units: Remove motor hold-down bolts. Frame-Mounted Units: Remove coupling, spacer, coupling guard and frame hold-down bolts.

9.4. Disassembly of Liquid End:

9.4.1. Remove casing bolts (370).

9.4.2. Remove back pull-out assembly from casing (100).

9.4.3. Unscrew impeller nut (304) with a socket wrench.

**CAUTION: DO NOT INSERT SCREWDRIVER BETWEEN IMPELLER VANES TO PREVENT ROTATION.**

It may be necessary to use a strap wrench around the impeller if impacting the socket wrench will not loosen the impeller bolt. Hold the shaft on frame mounted units.

9.4.4. Use two pry bars, 180° apart, to remove impeller (101) from shaft.

9.4.5. Remove impeller key (178) and seal spring.

9.4.6. With two pry bars 180° apart inserted through the windows of the motor adapter (108), pry on the end of the shaft sleeve (126). The mechanical seal rotary unit (383) will come off with the sleeve.

9.4.7. Remove the seal housing to adapter bolts (370H). Remove seal housing (184) together with stationary seal parts.

9.4.8. Place seal housing on flat surface and press out stationary seal parts.

9.5. Disassembly of bearing frame:

9.5.1. Remove bolts (370C) and bearing cover (134). Slide V-ring deflector (123) off shaft.

9.5.2. Remove shaft assembly from frame (228).

9.5.3. Remove lip seals (333A) from bearing frame and bearing cover if worn and are being replaced.

9.5.4. Straighten tang in lockwasher (382). Remove locknut (136) and lockwasher.

9.5.5. Use bearing puller or arbor press to remove ball bearings (112 & 168).

## 10. Reassembly:

- 10.1. All parts should be cleaned before assembly.
- 10.2. Refer to parts list to identify required replacement items. Specify pump index or catalog number when ordering parts.
- 10.3. Reassembly is the reverse of disassembly.
- 10.4. Observe the following when reassembling the bearing frame:
  - 10.4.1. Replace lip seals if worn or damaged.
  - 10.4.2. Replace ball bearings if loose, rough or noisy when rotated.
  - 10.4.3. Check shaft for runout at the sleeve area. Maximum permissible is .002" T.I.R.
- 10.5. Observe the following when reassembling the liquid-end:
  - 10.5.1. All mechanical seal components must be in good condition or leakage may result. Replacement of complete seal assembly, whenever seal has been removed, is good standard practice.

It is permissible to use a light lubricant, such as glycerin, to facilitate assembly. Do not contaminate the mechanical seal faces with lubricant.
  - 10.5.2. Inspect seal housing o-ring (513) and replace if damaged. This o-ring may be lubricated with petroleum jelly to ease assembly.
  - 10.5.3. Inspect impeller o-rings (412A) at the sleeve and locknut. Replace if damaged.
- 10.6. Check reassembled unit for binding. Correct as required.

## 11. Trouble Shooting Guide:

### MOTOR NOT RUNNING

(See causes 1 through 6)

### LITTLE OR NO LIQUID DELIVERED

(See causes 7 through 17)

### POWER CONSUMPTION TOO HIGH

(See causes 4, 17, 18, 19, 22)

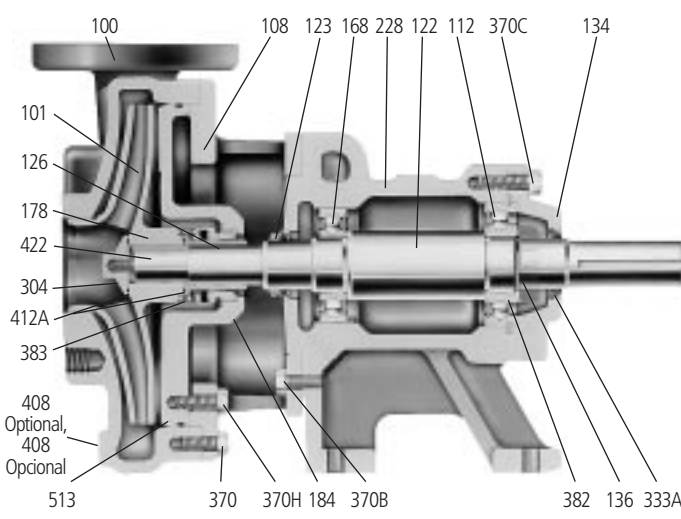
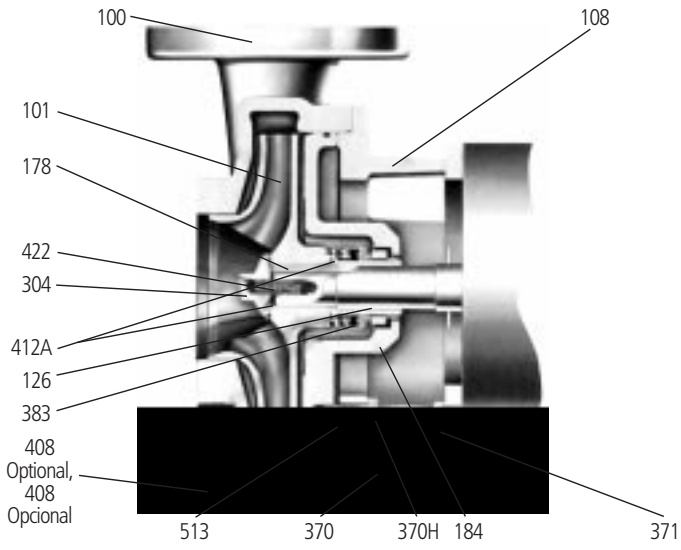
### EXCESSIVE NOISE AND VIBRATION

(See causes 4, 6, 9, 13, 15, 16, 18, 20, 21, 22)

#### PROBABLE CAUSE:

1. Tripped thermal protector
2. Open circuit breaker
3. Blown fuse
4. Rotating parts binding
5. Motor wired improperly
6. Defective motor
7. Not primed
8. Discharge plugged or valve closed
9. Incorrect rotation
10. Foot valve too small, suction not submerged, inlet screen plugged
11. Low voltage
12. Phase loss (3-phase only)
13. Air or gasses in liquid
14. System head too high
15. NPSHA too low: Suction lift too high or suction losses excessive. Check with vacuum gauge.
16. Impeller worn or plugged
17. Incorrect impeller diameter
18. Head too low causing excessive flow rate
19. Viscosity or specific gravity too high
20. Worn bearings
21. Pump or piping loose
22. Pump and motor misaligned

# Materials of Construction



Pump End Components		
Item No.	Description	Material
100*	Casing	316 SS investment cast
101*	Impeller	
184*	Seal housing	
304*	Impeller nut	316 SS
422	Impeller stud	Steel
178	Impeller key	
126*	Shaft sleeve	316 SS
412A	O-ring impeller	BUNA
408*	Pipe plug – 1/4" NPT (casing drain)	316 SS
513	O-ring casing	BUNA
370	Hex head cap screw (adapter to casing)	304SS
370H	Hex head cap screw (adapter to seal housing)	
383	Mechanical seal	Carbon/sil car/viton(std.)
		Carbon/sil car/EPR (opt.)
		Sil car/sil car/viton (opt.)
Power End Components		
108	Adapter	Cast iron
228	Bearing frame	
122	Pump shaft	Steel
168	Ball bearing (inboard)	Steel
112	Ball bearing (outboard)	
123	V-ring deflector	BUNA-N
136	Lock nut bearing	Steel
382	Lock washer bearing	
134	Bearing cover	Cast iron
333A	Lip seal bearing	BUNA/steel
193	Grease fitting	Steel
370B	Hex head cap screw (adapter to bearing frame)	
370C	Hex head cap screw (bearing frame to cover)	
<b>Materials Specifications</b>	<b>Material</b>	<b>Engineering Standard</b>
	Cast iron	ASTM A48 CL20
	Steel	ASTM A108/SAE 1200 series
	316 SS investment cast	ASTM A743 grade CF-8M
	316 SS	ASTM A276 type 316
304 SS	ASTM A276 type304	

\* Indicates components exposed to pumpage.

### GOULDS PUMPS LIMITED WARRANTY

This warranty applies to all water systems pumps manufactured by Goulds Pumps.

Any part or parts found to be defective within the warranty period shall be replaced at no charge to the dealer during the warranty period. The warranty period shall exist for a period of twelve (12) months from date of installation or eighteen (18) months from date of manufacture, whichever period is shorter.

A dealer who believes that a warranty claim exists must contact the authorized Goulds Pumps distributor from whom the pump was purchased and furnish complete details regarding the claim. The distributor is authorized to adjust any warranty claims utilizing the Goulds Pumps Customer Service Department.

**The warranty excludes:**

- (a) Labor, transportation and related costs incurred by the dealer;
- (b) Reinstallation costs of repaired equipment;
- (c) Reinstallation costs of replacement equipment;
- (d) Consequential damages of any kind; and,
- (e) Reimbursement for loss caused by interruption of service.

**For purposes of this warranty, the following terms have these definitions:**

- (1) "Distributor" means any individual, partnership, corporation, association, or other legal relationship that stands between Goulds Pumps and the dealer in purchases, consignments or contracts for sale of the subject pumps.
- (2) "Dealer" means any individual, partnership, corporation, association, or other legal relationship which engages in the business of selling or leasing pumps to customers.
- (3) "Customer" means any entity who buys or leases the subject pumps from a dealer. The "customer" may mean an individual, partnership, corporation, limited liability company, association or other legal entity which may engage in any type of business.

**THIS WARRANTY EXTENDS TO THE DEALER ONLY.**